Economic evaluation of Helicobacter pylori eradication for peptic ulcer disease in comparison with a conventional strategy in Japan

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of a Helicobacter pylori (HP) eradication strategy for peptic ulcer disease (PUD) in Japan. The eradication strategy was compared with the conventional strategy, which consisted of maintenance therapy using a H2-receptor antagonist.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised hypothetical patients who were diagnosed as suffering from PUD.

Setting
The setting was secondary care. The economic study was carried out at the Gastroenterology Department, Tohoku University School of Medicine, Japan.

Dates to which data relate
The effectiveness data related to 1998 to 2000. The dates to which the resource use and cost data related were not specifically stated.

Source of effectiveness data
The effectiveness data were derived from a review of studies.

Modelling
Decision trees, which utilised effectiveness probabilities from the literature, were used to calculate the costs of the HP eradication strategy and conventional maintenance therapy for 5 years.

Outcomes assessed in the review
The outcomes assessed in the review were:

the HP infection rate;
the first-stage eradication rate;
the second-stage eradication rate;
the ulcer cure rate using conventional maintenance therapy;
the ulcer recurrence rate during maintenance therapy;
the ulcer recurrence rate after successful eradication; and
the sensitivity and specificity of the 13C-urea breath test and microscopy.

Study designs and other criteria for inclusion in the review
Meta-analysis studies were included when examining the rates of HP infection and eradication, and ulcer cure and recurrence.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Not explicitly stated.

Methods of combining primary studies
The parameter estimates were derived from the results of meta-analyses. Alternatively, individual studies were used selectively to derive other estimates, such as the sensitivity and specificity for test characteristics.

Investigation of differences between primary studies
Not stated.

Results of the review
The HP infection rate was 71.2%.

The first-stage eradication rate was 81.9%.

The second-stage eradication rate was 88.0%.

The cure rate using conventional maintenance therapy was 89.3%.

The ulcer recurrence rate during maintenance therapy was 19.7%.

The ulcer recurrence rate after successful eradication was 4.0%.

The sensitivity of the urea breath test was 98.2% and the specificity was 97.9%.
The sensitivity of the urea breath test plus microscopy was 98.6% and the specificity was 100%.

**Measure of benefits used in the economic analysis**
The author did not develop a summary benefit measure in the economic analysis. In effect, a cost-consequences study was undertaken.

**Direct costs**
The direct costs included were for endoscopy, the urea breath test (including medication and examination costs), microscopy, first- and second-stage eradication, first- and second-stage treatment, and maintenance therapy. The costs of first- and second-stage eradication included 7 days’ medication at each stage. The costs of first- and second-stage treatment included medication for 56 days (first) and 112 days (second), respectively. The cost of maintenance therapy included medication for 28 days. The costs were calculated based on the health insurance points for the Japanese health care system, set for the year in which the study was carried out (probably 2001). The costs and the quantities were not reported separately. Discounting was not carried out, but it may have been relevant since the model analysed the costs during a 5-year period. The price year was not stated.

**Statistical analysis of costs**
No statistical analysis of the costs was carried out.

**Indirect Costs**
No indirect costs were included.

**Currency**
Japanese yen (Y).

**Sensitivity analysis**
One-way sensitivity analyses were conducted to examine how the costs for the eradication strategy and maintenance therapy were affected by the eradication and recurrence rates. First, the eradication rate was changed (range: 10 - 90%), then the ulcer recurrence rate was changed (range: 10 - 90%).

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
For the first year, the total costs were approximately Y120,000 for the eradication strategy and approximately Y114,000 for maintenance therapy.

From the second year, the cost-difference between the two methods grew due to the clearly lowered recurrence rate among those patients treated with the eradication strategy. At the fifth year, the costs for the eradication strategy were Y135,243, while those for maintenance therapy were Y436,633.

The results of the sensitivity analyses showed that, compared with maintenance therapy, the lower costs for the eradication strategy persisted regardless of changes in the eradication rates. On the other hand, high ulcer recurrence rates (above 80%) were shown to make the eradication strategy more costly than maintenance therapy. However, recurrence rates above 80% were considered unrealistically high. Therefore, the author concluded that the eradication strategy was less costly than maintenance therapy.
Synthesis of costs and benefits
Not applicable due to the cost-consequences analysis carried out.

Authors' conclusions
Compared with traditional maintenance therapy, Helicobacter pylori (HP) eradication for peptic ulcer disease (PUD) led to a reduction in the medical costs. If HP eradication was proven to have suppressive effects on stomach cancer, the cost-difference between the two methods of treatment would still increase.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator (long-term maintenance therapy) was clear and was justified by the author. You should consider if the technologies examined are relevant to your own context.

Validity of estimate of measure of effectiveness
The estimates of effectiveness, as used in the decision analytic model, were derived from a mixture of meta-analyses and selected individual studies. The methods used to identify the included studies were not stated in the paper. However, sensitivity analyses were conducted on key model parameters and the results were clearly presented, which enhances the validity and generalisability of the results.

Validity of estimate of measure of benefit
The author did not develop a summary benefit measure for the economic analysis. The effectiveness data were used to populate the model, which had cost as its outcome.

Validity of estimate of costs
The cost analysis was based on the Japanese health care system (social insurance points) and, as such, was context-specific. In addition, the unit costs and the resource quantities were not provided separately and the price year was not explicitly reported. These features limit the generalisability of the cost results to other settings. The costs were treated deterministically, which accords with the reimbursement rates for medical procedures in Japan.

Other issues
Reference was made to other similar studies that were conducted outside Japan. However, the results were not compared with those from similar studies in Japan due to their scarcity. The issue of generalisability was discussed. The author argued that the cost-effectiveness of the eradication method needs to be studied in the target setting or country due to variations in diagnostic methods and cost structures between countries. The sensitivity analyses, which were conducted on effectiveness parameters used in the model, also enhance the generalisability of the results.

Implications of the study
The findings suggested that, compared with traditional maintenance therapy, HP eradication for PUD led to a reduction in the medical costs. If HP eradication is proven to have suppressive effects on stomach cancer, the cost-difference between the two methods of treatment will still increase. In terms of future research, the author stated that the diagnostic accuracy of tests needs further study, to consider the economic and clinical impact of false results.

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